

STEM activities for home.

Some of these links are for American sites.

Here's a comparison of the American grade system to the UK system.

Age	UK Year (England Only)	Key Stage (England Only)	U.S. Level
3 to 4 years	----	Early Years	Pre-Kindergarten (Preschool)
4 to 5 years	Reception	Early Years	Pre-Kindergarten (Preschool)
5 to 6 years	Year 1 - Infants School	Key Stage 1	Kindergarten (Elementary School)
6 to 7 years	Year 2	Key Stage 1	1st Grade (Elementary School)
7 to 8 years	Year 3 - Junior School	Key Stage 2	2nd Grade
8 to 9 years	Year 4	Key Stage 2	3rd Grade
9 to 10 years	Year 5	Key Stage 2	4th Grade
10 to 11 years	Year 6	Key Stage 2	5th Grade
11 to 12 years	Year 7 - Secondary School	Key Stage 3	6th Grade - Middle School
12 to 13 years	Year 8	Key Stage 3	7th Grade
13 to 14 years	Year 9	KS3	8th Grade
14 to 15 years	Year 10	Key Stage 4	9th Grade (Freshman) - High School
15 to 16 years	Year 11	Key Stage 4	10th Grade (Sophomore)
16 to 17 years	Year 12 (6th Form)	Key Stage 5	11th Grade (Junior Year)
17 to 18 years	Year 13 (6th Form) often	Key Stage 5	12th Grade (Senior Year)

Science Activities

Science Museum online resources

Explore over 325,000 objects and archives from the Science Museum, Science and Industry Museum, National Science and Media Museum, National Railway Museum and Locomotion.

<https://collection.sciencemuseumgroup.org.uk/>

There are some activities for 5 – 16 year olds to do with everyday materials. I'd recommend

- “Instant ice cream” experiment (make sure the bags are properly sealed otherwise you may end up with an unexpected new interior decoration).
- “Make it fly” which uses paper to investigate the forces involved in making planes fly.
- “Ear gongs” to investigate sound, vibrations and materials.
- A whole booklet on Kitchen Science. Be prepared for ooblique!

<https://learning-resources.sciencemuseum.org.uk/resources/?type=at-home>

Mystery Science.com

Mystery Science is an online science resource, currently free til June, with videos, discussion questions, and hands-on activities. Each lesson starts with a question to spark students' curiosity.

There are two types of lessons:

- Full Lessons (45-90 minutes, with hands-on activities): Aligned to grade-level standards, easy-prep activities, videos with built-in discussion questions.
- Mini-Lessons (5-15 minutes, all digital): Videos answer real student questions using stunning visuals. Great for independent exploration - no adult support needed!

We've collected a sample of the easiest lessons to do from home, organized by grade-level, and put them on a single page: <https://mysteryscience.com/school-closure-planning>

How Stuff Works

Good for children, teens and adults who are curious and enthusiastic about STEM, a place to find answers to their questions.

<https://science.howstuffworks.com/>

Space Enthusiasts

Current images from space are revealing the impact of human activity on air quality together with the latest findings from the exploration of Mars.

NASA

For space enthusiasts, NASA site includes activities, access to the image library and live videos with astronauts at the international space station.

<https://www.nasa.gov/stem>

European Space Agency

Activities, missions and images.

<https://www.esa.int/kids/en/home>

Technology activities

Learn about 3D printing (with or without a 3D Printer) with Create Education

CREATE Education have put together this blog to support teachers and parents who are faced with the prospect of supporting home learning.

Extended time at home for students provides an opportunity for them to develop existing skills or to learn new ones, with many of these skills being vital for future jobs. Students from the age of 7 upwards, can learn about 3D printing and additive manufacturing and develop their own 3D modelling skills easily from a home environment using the large range of free resources and platforms available through CREATE Education and our partners.

<https://www.createeducation.com/blog/learn-3d-printing-with-free-home-learning-resources-in-the-event-of-covid-19-school-closures/#1584462373057-df5e4f6a-2b09>

Let's Code with BBC Micro:Bit

BBC Micro:Bit is tiny computer, developed in partnership with Lancaster University. Inputs and outputs are an important part of any computer system. As a very small computer, the BBC micro:bit has plenty of inputs and outputs to learn about and use.

- 25 LEDs to program.
- two buttons you can program, and a reset button.
- Radio is a way of sending and receiving messages and BBC micro:bits can use radio waves to communicate with each other.
- An accelerometer in your BBC micro:bit detects when you tilt it left to right, backwards and forwards and up and down.
- an inbuilt compass that can detect the direction in which it is facing.
- A light sensor; uses the LEDs to sense the levels of light and lets you program your micro:bit as a light sensor.
- a temperature sensor inside the processor which can give you an approximation of the air temperature.
- 25 gold strips, called pins. These pins allow you to really get creative. You can create circuits, connect external things like buzzers and motors and make your own fun projects.
- Sounds can be programmed - from single notes, tones and beats to your own musical compositions.

<https://microbit.org/>

You can buy a BBC Micro:Bit from Pimoroni (£13.50) You'll need to add the battery pack and USB cable (£3.60)

<https://shop.pimoroni.com/collections/micro-bit-uk>

You can also download the coding app for android and Apple tablets and phones. You can download code by pairing the tablet/phone with the Micro:Bit using Bluetooth.

Block coding with step-by-step instructions for mini projects and lots of creative ideas to try out.

Engineering Activities

Instructables

Thousands of activities freely shared here with step-by-step instructions. Some requiring more resources than others. Including cooking, growing, science, design and technology.

<https://www.instructables.com/>

For example,

- Bridge building,
- Marshmallow (or scrunpled up paper) launcher, can become very competitive <https://www.instructables.com/id/Marshmallow-Launcher-1/>
- Making a kaleidoscope, great for children who enjoy drawing and colouring <https://www.instructables.com/howto/kaleidoscope/>
- Marble run, hours and hours of engrossed engineering thinking. Be prepared to have various contraptions around rooms, shelves, down the stairs etc; <https://www.instructables.com/id/School-Wide-STEM-Ball-Run/>
- Lego idea studio <https://www.instructables.com/id/LEGOTinkering/>
- Make a clinometer for using maths and angles to measure the height of trees and buildings <https://www.instructables.com/id/Clinometer-2/>
- Take apart and rebuild toys; primary children loved taking part a dynamo torch, separating it into as many components as possible without breaking it. They didn't rebuild it afterwards! If you have unloved unwanted toys, maybe you could take them apart and recombine them to make a new animal, vehicle, robot etc <https://www.instructables.com/id/Take-Apart-and-Rebuild-Toys/>

Build a ridiculous pointless mechanical machine

This is a challenge to build a ridiculous pointless machine to do a job that would be easier and take less effort to do yourself! You might create a machine to close your bedroom door, or even tidy your bedroom for you. It might be an alarm system for the kitchen cupboard containing the biscuits!

Joseph Herscher makes a living from combining simple machines to create one ridiculously complex pointless machine. Children and adults find his machines utterly fascinating and funny. His videos really inspire children to be creative and become natural, instinctive engineers to inspire them to build, test, improve, problem solve.

Can you combine three or more of the six simple machines to create your complex machine?

- 1) Inclined plane (ramp)
- 2) Wheels and axles
- 3) Lever
- 4) Pulley

- 5) Wedge
- 6) Screw

No special equipment required. Create ramps (inclined planes) using books. Use the wheels and axles to transfer energy. Use loo roll tubes, cotton reels and string to create pulleys. Use dominoes or books as levers. Use marbles, balls, jars and toy cars to transfer energy through your machines. Use different heights and gravity to keep the momentum.

Start with the stamp licker to get the idea, in which Joseph uses simple, everyday items around the home to create and combine simple machines to make a complex machine that wets the stamp for him and avoids him getting the nasty glue taste on his tongue.

<https://www.youtube.com/watch?v=Yk4CziNHxpQ>

Children love the cake server machine too. In fact they would watch all of them (maybe avoid the haircutting machine if you have children devoid of fear and self protection!).

<https://www.youtube.com/user/allonewordplease/featured>

Design Squad

Lots of engineering and design challenges and activities, featuring clear instructions, videos and every day materials.

<https://pbskids.org/designsquad/>

Including space related activities;

- the moon rover <https://pbskids.org/designsquad/build/roving-moon/>
- a remote arm <https://pbskids.org/designsquad/build/helping-hand/>
- design for protecting astronauts when they touch down on Mars <https://pbskids.org/designsquad/build/touchdown/>

Engineering and design with the global community of FixEd

FixEd is the think-and-do tank concerned with inspiring and equipping creative, ingenious and generous problem-solvers around the world (especially, though not exclusively, Fixperts).

<http://fixing.education/about>

STEM TV shows for children

Dick and Dom Absolute Genius clips

<https://www.bbc.co.uk/teach/class-clips-video/ks2-absolute-genius/zhcx47h>

Kids' Science

Kids Science the home for awesome children's science shows including full series of Absolute Genius; https://www.youtube.com/channel/UCwWa8EzP8vul_hvFWOTryEg

Maths

<https://www.khanacademy.org/>

<https://www.bbc.co.uk/bitesize>

Hundreds of STEM resources from American sites

<https://www.mastersindatasience.org/blog/the-ultimate-stem-guide-for-kids-239-cool-sites-about-science-technology-engineering-and-math/>

Other resources for wellbeing

Free audio books

Amazon Audible have made their audio books collection available for free. You don't need to log in or provide any bank details.

<https://stories.audible.com/start-listen>

Storytellers

- **Ian Douglas** from Cumbria
<https://wildrumpus.org.uk/tales-by-the-fire-with-ian-douglas/>
- **Ursula Holden Gill** from Lancashire, the storyteller commissioned to write stories about engineering heritage of Morecambe Bay as an introduction to our Royal Academy of Engineering Ingenious Project.
My favourite is "Fairies in the Gutter".
<https://www.youtube.com/channel/UCAV0hLf1HBf8Ae3a9n1pIVw>
- **Peter Chand**
<https://www.youtube.com/channel/UCWtF4UqblmwkrQ901CucFzg>
South Asian stories collected from elders living in the Black Country area in the Midlands. <http://tonguetiedtwisted.co.uk/show/>

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Supporting anxious children

Newswise contains links and activities to explain the current situation and support anxious children.

<https://www.theguardian.com/newswise/2020/mar/21/wellbeing-and-the-news>

Lots of child friendly yoga classes available, free, online in which children do tradition yoga postures through stories.

Lunchtime doodling

Learn to draw with Mo Willems;

https://www.youtube.com/playlist?list=PL14hRqd0PELGbKihHuTqx_pbvCLqGbOkF